

THE *CULTUS DECISUS* COMPLEX OF EASTERN NORTH AMERICA (PLECOPTERA: PERLODIDAE)

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Abstract.—The *Cultus decisus* complex of eastern North America is reviewed, and *C. verticalis* (Banks) and *C. decisus isolatus* (Banks) are removed from synonymy with *C. decisus decisus* (Walker). The three taxa have distinctive eggs, but no differences were observed in adults of *C. decisus decisus* and *C. decisus isolatus*.

Since Ricker's (1952) study, *Cultus decisus* (Walker) has been regarded as a variable species which ranges from southern Canada, along the Appalachians, to northern Georgia. The most recent taxonomic treatment (Hitchcock 1974) includes *Perla verticalis* Banks and *Isoperla isolata* Banks as synonyms, but our study of available types and other specimens suggests these names represent valid taxa. *C. decisus* has also been incorrectly applied to specimens from Great Whale River (Ricker et al. 1968), which are more similar to *C. aestivalis* (Needham and Claassen), and by P. P. Harper (unpub. record) to a similar series collected at James Bay. Careful study of the western Nearctic *Cultus* species is needed to clarify the status of these specimens.

Specimens used in this study are deposited in the British Museum of Natural History (BMNH), the Canadian National Collection (CNC), the Illinois Natural History Survey (INHS), the Museum of Comparative Zoology (MCZ), the Royal Ontario Museum (ROM), the United States National Museum of Natural History (USNM), the Virginia Polytechnic Institute and State University collection (VPI), and in the pri-

vate collections of R. F. Kirchner (RFK) and the authors (BPS, SWS, BCK).

Cultus decisus decisus (Walker)

Perla decisa Walker (1852). Holotype ♂, St. Martin's Falls, Albany River, Ontario (BMNH).

Diploperla decisa: Ricker (1944).

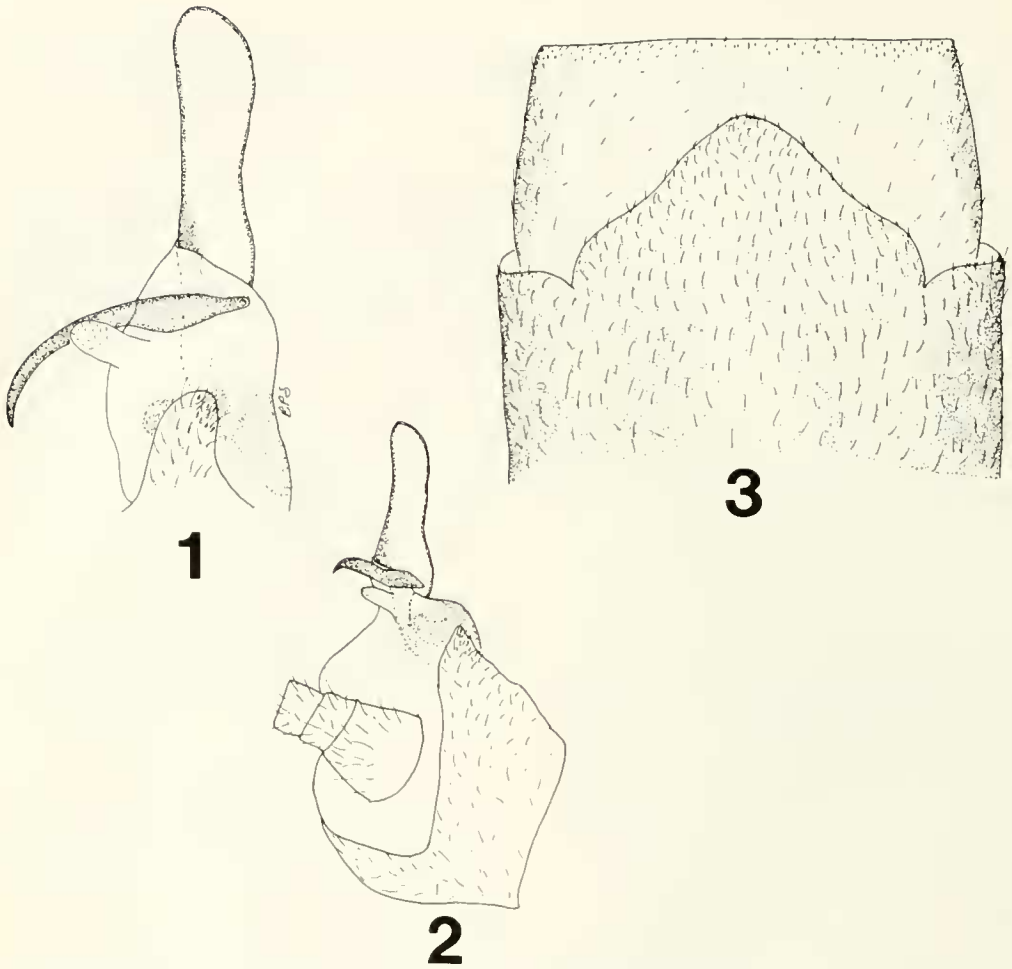
Isogenus (Cultus) decisus: Ricker (1952), in part.

Cultus decisus: Illies (1966), in part.

Male genitalia.—Lobe on sternum 7 well developed, no lobe on sternum 8. Epiproct with weakly sclerotized anterior and posterior bands; mesal section membranous without spinules or setae. Lateral stylets long, slender and slightly curved ventrad. Membranous cowl with a pair of posterolateral spiculate lobes and weakly sclerotized paragenital plates. Hemitergal lobes typical of *Diploperlini* (Fig. 1).

Female genitalia.—Subgenital plate broadly triangular, reaching beyond midpoint of sternum 9.

Egg.—Dorsal surface and lid covered with irregular, hexagonal follicle cell impressions



Figs. 1-3. *C. decisus* genitalia. 1. *C. decisus decisus* epiproct complex, lateral. 2. *C. decisus isolatus* male terminalia lateral. 3. *C. decisus isolatus* female sterna 8-9.

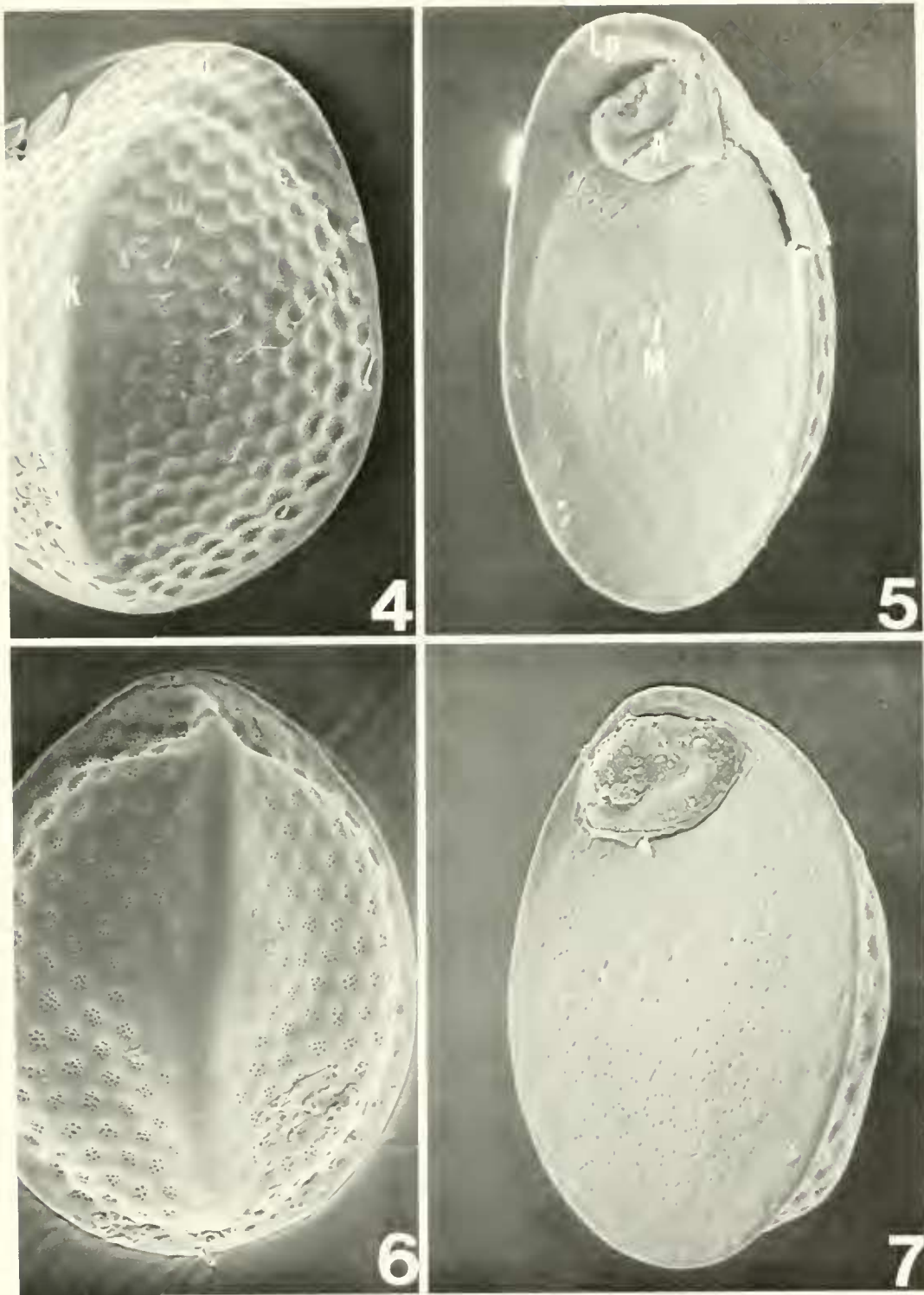
(FCIs). FCI walls thick and smooth, concave floors contain ca. 30 minute aeropyles. Sharp, smooth keel extends from posterior third to near lid (Fig. 4). Lid offset by irregular suture which becomes less distinct posteriorly; lateral margins smooth (Fig. 4). Ventral surface flat and covered with FCIs. FCI walls consist of rows of shallow pits. Lip smooth, anchor without specialized superstructure. Micropyles ventral, slightly anterior to equator (Fig. 5).

Specimens examined.—MICHIGAN: Benzie Co., Platte River, Honor, 27-V-39, T. H. Frison and H. H. Ross, 2 ♂, 1 ♀ (INHS).

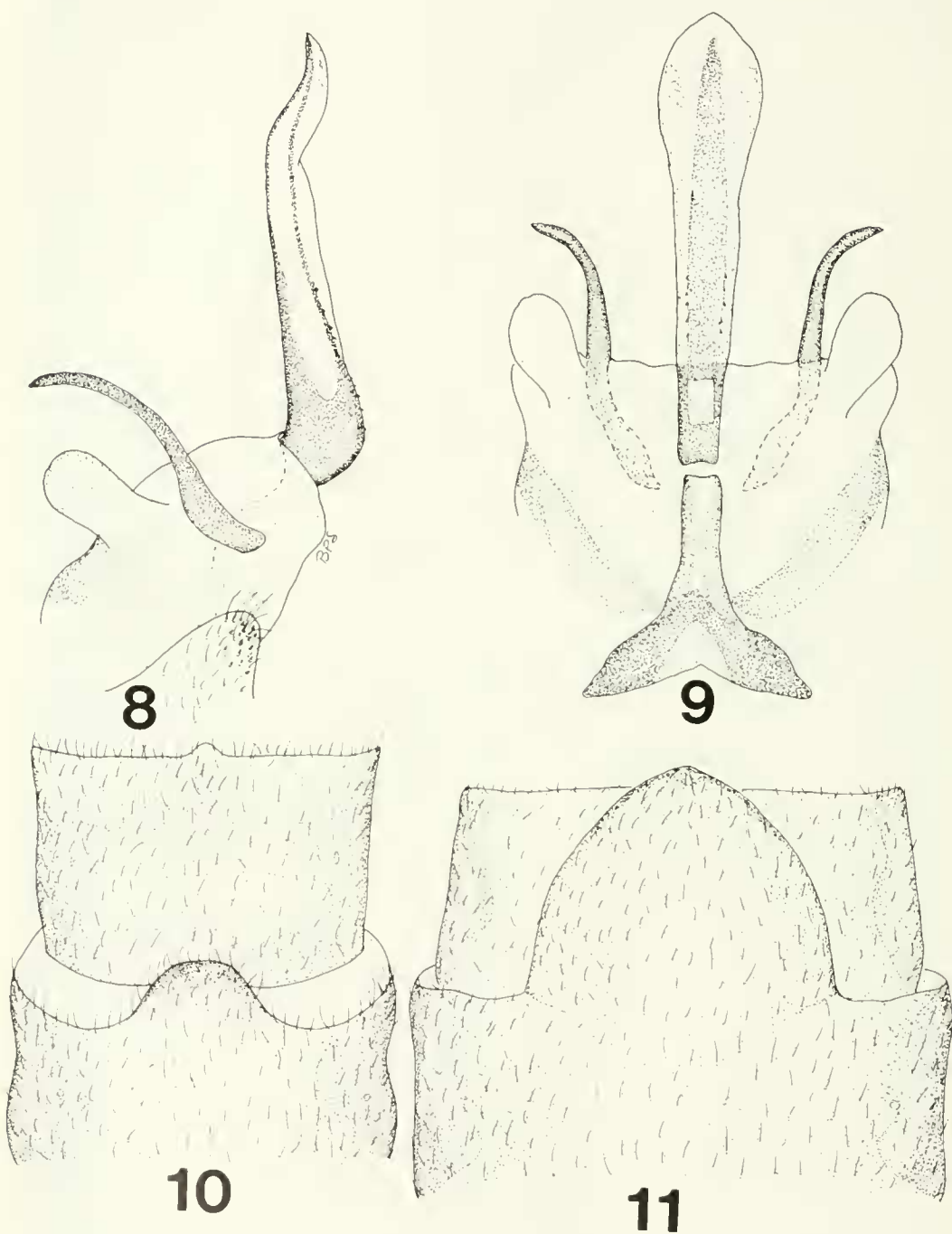
Cheboygan Co., Sturgeon River, 3-VII-38, J. W. Leonard, 1 ♀ (USNM). Mecosta Co., Muskegon River, Big Rapids, 22-V-36, T. H. Frison and H. H. Ross, 2 ♂, 5 ♀ (USNM, INHS). Otsego Co., Pigeon River, 23-VI-36, J. W. Leonard, 1 ♂, 2 ♀ (USNM, INHS). ONTARIO: Albany River, St. Martin's Falls, 1 ♂ (Holotype, BMNH).

***Cultus decisus isolatus* (Banks),
NEW STATUS**

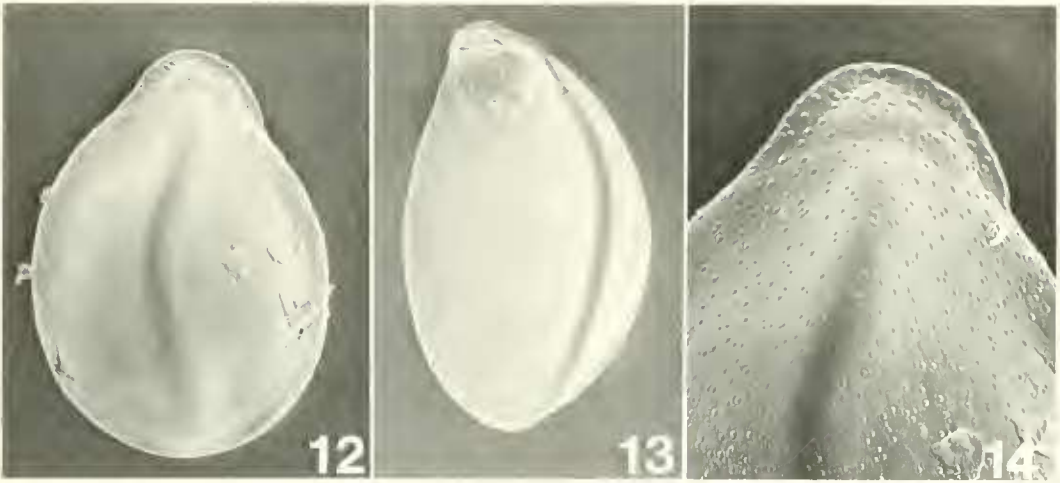
Isoperla isolata Banks (1920). Holotype ♂, Hot Springs, (Madison County) North Carolina (MCZ #10,824).



Figs. 4-7. *C. decusus* eggs. 4. *C. decusus decusus*, Otsego Co., Michigan, dorsal aspect, 380 $\times$. 5. *C. decusus decusus* ventral aspect, 300 $\times$. 6. *C. decusus isolatus*, Montgomery Co., Virginia, dorsal aspect, 300 $\times$. 7. *C. decusus isolatus* ventral aspect, 300 $\times$ (Ld—Lid, Lp—Lip, K—Keel, M—Micropyle, A—Anchor).



Figs. 8-11. *C. verticalis* genitalia. 8. Epiproct complex, lateral. 9. Epiproct complex, dorsoanterior aspect. 10. Male sternite 7-8. 11. Female sternite 8-9.



Figs. 12–14. *C. verticalis* eggs, Giles Co., Virginia. 12. Dorsal aspect, 270×. 13. Ventrolateral aspect, 270×. 14. Dorsoanterior end, 500×.

Perla decisa: Needham and Claassen (1925), in part.

Cultus decisa: Illies (1966), in part.

Male genitalia.—Indistinguishable from *C. decisa decisa* (Fig. 2).

Female genitalia.—Indistinguishable from *C. decisa decisa* (Fig. 3).

Egg.—Similar to *C. decisa decisa* but dorsal FCIs enclose ca. 10–15 aeropyles, and keel extends from lid to posterior margin (Figs. 6–7).

Specimens examined.—GEORGIA: Fan-nin Co., Toccoa River, Hwy 60, 19-V-85, B. C. Kondratieff, 1 ♂, 12 ♀ (VPI). NORTH CAROLINA: Madison Co., Hot Springs, 1 ♂ (Holotype, MCZ). VIRGINIA: Carroll Co., New River, Rt. 606, 19-V-80/22-IV-81, B. C. Kondratieff, 2 ♂, 3 ♀ (VPI). Montgomery Co., Little River, Rt. 787, 24-V-83, B. C. Kondratieff, 1 ♀ (VPI).

Comments.—Reliable characters for distinguishing adults of *C. decisa decisa* from *C. decisa isolatus* were not observed. Be-cause of the range disjunction and the dis-tinctive eggs (see Figs. 4 and 6), we are giv-ing these populations subspecific status. Hopefully, gravid females with associated males and nymphs from intermediate lo-

calities will soon be available to permit test-ing of this classification.

Cultus verticalis (Banks),
NEW STATUS

Perla verticalis Banks (1920). Holotype ♀, Franconia, (Grafton Co.) New Hamp-shire (MCZ #10,815).

Diploperla verticalis: Frison (1942).

Isogenus (Cultus) decisa: Ricker (1952), in part.

Cultus decisa: Illies (1966), in part.

Male genitalia.—Lobe on sternum 7 well developed, lobe on sternum 8 small (Fig. 10). Epiproct relatively more sclerotized than in *C. decisa*, and with small serrations along anterior sclerite. Lateral stylets, cowl and hemitergal lobes typical of genus (Figs. 8–9).

Female genitalia.—Lateral margins of subgenital plate more convex and plate rel-atively longer than in *C. decisa* (Fig. 11).

Egg.—Dorsal surface covered with faint FCIs and scattered globular bodies. FCI walls are shallow furrows, floors without aeropyles. Keel smooth with a few globular bodies clustered at either end (Figs. 12, 14). Ventral surface covered with FCIs similar

to those on dorsum. Micropyles ventral, slightly anterior to equator (Fig. 13).

Specimens examined.—NEW HAMPSHIRE: Grafton Co., Franconia, Slosson, 1 ♀ (Holotype, MCZ). NORTH CAROLINA: Haywood Co., Cataloochee Creek, Great Smoky Mountains National Park, 16-V-83/3-V-85, B. C. Kondratieff, 16 ♂, 8 ♀ (BCK). Swain Co., Oconoluftee River, Cherokee, 2-VI-78, B. Stark and K. W. Stewart, 1 ♂ (BPS). Deep Creek, Deep Creek Campground, 19-V-70, G. Wiggins and T. Yamamoto, 1 ♂ (ROM). PENNSYLVANIA: Franklin, 23-VI-67, S. Gilmore, 1 ♂ (USNM). QUEBEC: Brome, 1-VI-36, G. S. Walley, 1 ♂ (CNC). TENNESSEE: Sevier Co., Little River, Great Smoky Mountains National Park, 5-V-79, B. Stark, 2 ♂, 2 ♀ (BPS). VERMONT: Bennington Co., Battenkill, Rt. 313, 25-V-80, A. C. Graham, 1 ♂ (SWS). VIRGINIA: Giles Co., Little Stony Creek, Rt. 460, 7-17-V-80, B. C. Kondratieff, 7 ♂, 2 ♀ (VPI). Big Stony Creek, Rt. 635, 26-V-78, D. Gray and D. Minnick, 19 ♂ (VPI). Stony Creek, 28-V-79, E. Beltinger, 1 ♂ (VPI). Patrick Co., Dan River, Rt. 601, 16-V-81, Geivard, 1 ♂ (VPI). Smyth Co., Big Laurel Creek, 28-V-78, G. T. and M. W. Voreh, 1 ♂, 1 ♀ (RFK). WEST VIRGINIA: Pocahontas Co., Williams River, Day Run, 30-VI-82, W. Mathis and O. S. Flint, 2 ♀ (USNM).

Comments.—The pinned female holotype had no eggs, but the subgenital plate is consistent with our figures from a Giles Co., Virginia, specimen (Fig. 11) and the other specimens listed above. Genitalic illustrations given by Needham and Claassen (1925) (as *Perla verticalis*), Hitchcock (1974) (as *C. decisus*) and Kondratieff and Voshell (1982) (as *C. decisus*) are of this species.

KEY TO *CULTUS DECISUS* COMPLEX ADULTS

1. Anterior sclerite of epiproct armed basally with small serrations (Figs. 8, 9); sternum 8 with small lobe (Fig. 10); female subgenital plate parabolic, reaching posterior margin of sternum 9 (Fig. 11); chorionic FCIs not enclosing aeropyles (Figs. 12–14) *C. verticalis*

- Anterior sclerite of male epiproct without serrations (Figs. 1, 2); sternum 8 without lobe; female subgenital plate triangular, not reaching posterior margin of sternum 9 (Fig. 3); chorionic FCIs enclose aeropyles (Figs. 4, 6) 2
- 2. Aeropyles of chorionic FCIs densely packed, small, ca. 30 or more in each FCI (Fig. 4); dorsal keel of egg not extending onto lid (Fig. 4); known from Great Lakes region *C. decisus decisus*
- Aeropyles of chorionic FCIs larger and more widely spaced, ca. 15 or less in each FCI (Fig. 6); dorsal keel extends onto base of lid (Fig. 6); known from southern Appalachians *C. decisus isolatus*

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